### Relevant International Issues

The planning, construction, and operation of sewer infrastructure in Tijuana have international ramifications, presenting a variety of challenges and opportunities. To date, the governments of Mexico and the United States, through their respective sections in the International Boundary and Water Commission (IBWC), have agreed to the following minutes relating to wastewater management in the Tijuana-San Diego region.

**Minutes 270**. Recommendations for the Solution of the Border Sanitation Problem at San Diego, California / Tijuana, Baja California, April 30, 1985.

**Minutes 283**. Conceptual Plan for the International Solution to the Border Sanitation Problem in San Diego, California / Tijuana, Baja California, July 2, 1990.

**Minutes 296**. Distribution of Construction, Operation, and Maintenance Costs for the International Wastewater Treatment Plant, April 16, 1997.

**Minutes 298**. Recommendations for Construction of Works Parallel to the City of Tijuana, B.C. Wastewater Pumping and Disposal System and Rehabilitation of the San Antonio de Los Buenos Treatment Plant, December 2, 1997.

These minutes promote cooperation between both countries in water resource management, and they open the possibility for exchange of information, technology, and financing.

## 3.4.2 Infrastructure Description

The study area can be divided into nine main basins. To evaluate the physical conditions of the basins, technical meetings and field trips were held with personnel from CESPT'S Potable Water and Sewer-System-Maintenance Districts. During these trips, the condition of the terrain and infrastructure was observed.

The sewage collectors and subcollectors located in each basin were identified, as well as some of their main characteristics. These activities provided a preliminary understanding of sewer-system issues.

The sewer system operates mostly by gravity, with the exception of the transmission lines to the wastewater treatment plants. The study area has 21 pumping stations, of which four are within the Tijuana River Basin.

As mentioned above, the topography in the area causes most of the wastewater to flow toward the Tijuana River. These flows are controlled differently during the dry periods and during the rainy season. In dry periods, all the water that flows in the river is pumped from the CILA pumping station to the international interceptor, from where it flows by gravity to the PB-1 pumping station, and subsequently to the San Antonio de Los Buenos Wastewater Treatment Plant or to the SBIWTP.

In contrast, during the rainy season, CILA pumping station stops operating when the flow of the river exceeds 11 mgd (500 l/s), allowing the water to follow its natural course in the river and to discharge in the ocean without prior treatment.

There are some areas where the wastewater does not have a natural outlet to the Tijuana River or to the ocean. In these cases, lift stations are used to transfer the wastewater to other basins, from which the wastewater flows by gravity toward the pumping stations that feed the treatment plants. Table J-1, Appendix J lists all wastewater lift and pump stations.

Some of the pumping stations (PB-1, Matadero PB-3, Laureles, and CILA) discharge wastewater when the flow exceeds its pumping capacity due to rainfall. It is important to note that some of these arroyos flow toward the United States, creating concern at the international level.

Table 3-16 summarizes the flows registered in 2001 in some of the most important pumping stations.

**Table 3-16**
**Wastewater Flow at Pumping Stations (2001)**

| City and Facility | Monthly Volume ($m^3$) | Flow (l/s) |
|---|---|---|
| **Tijuana** | | |
| PB1** | 2,315,877 | 881 |
| PB3 | 496,297 | 189 |
| PB SEDUE Playas | 229,964 | 88 |
| PB Laureles | 50,038 | 19 |
| Cárcamo Mirador I | 25,728 | 10 |
| Planta Fraccionamiento San Antonio del Mar | 5,612 | 2 |
| Playas de Rosarito | | |
| Emisor Rosarito | 89,095 | 34 |

** PB1 has two sub-stations, PB-1A and PB-1B. The flow shown in the table is for PB-1B only since PB-1A operates only as a backup.

Source: Management Indicators for January 2002 and 1996 to 2002. Sub-Direction of Planning, Department of Control and Central Distribution.

Similarly, Table 3-17 shows wastewater flows recorded during the last three years.

**Table 3-17**
**Collected and Quantified Wastewater Flows, Tijuana and Rosarito**

| Year | m³/year | l/s |
|---|---|---|
| 1999 | 72,656,180 | 2,304 |
| 2000 | 75,719,807 | 2,394 |
| 2001 | 73,482,064 | 2,330 |
| Source: CESPT | | |

## 3.4.3 Sewer System Capacity

The sewer system is approximately 1,593 miles (2,564 km) long, with pipe diameters ranging from 4 to 72-inches (10 to 183 cm). Approximately 83 percent of the lines are 6-inches (20 cm), diameter and are primarily laterals. Table J-2, Appendix J, presents detailed information on the diameters and material used in the lines.

According to CESPT personnel, PVC pipe began to be used in the 1990s, which indicates that this sewer pipe is not too old. However, most of the pipe installed in the 70s and 80s was concrete.

Information presented in Table J-2, Appendix J, shows that 44 percent of the lines that are 24 to 54-inches (60 to 140 cm), in diameter are made of simple concrete. For diameters ranging from 54 to 100-inches (140 to 250 cm), 73 percent of the lines are made of simple concrete. Most of these lines are severely corroded and have significant debris accumulation. Moreover, the cleaning that CESPT personnel do may be contributing to the structural weakening of the pipes.

A significant quantity of pipe has surpassed its useful life, particularly in the downtown area of the city, where some of the lines were installed approximately 50 years ago. These old pipes present a risk of leakages and spills that could contaminate the water and soil, as well as resulting in soil subsidence.

For the 24-inches (60 cm) diameter pipe alone, it is estimated that approximately 50 miles (80 km) of pipe need to be rehabilitated.

Appendix J, Table J-3 lists the characteristics of the sewage collectors and subcollectors in Tijuana and Playas de Rosarito.

As previously mentioned, it is estimated that 79 percent of the population in the study area is connected to the sewer system, while 21 percent use latrines, septic tanks, or open ditches to meet their wastewater disposal needs. Part of this discharge will likely reach bodies of water or surface channels, creating potential public health and environmental problems.

To identify sewer system problems more precisely, a series of meetings and interviews were held with staff of each maintenance district where problems are considered most significant. Similarly, data provided in the documents prepared by the Department of Operational Control (Departamento de Control Operacional), were analyzed (CESPT, 2001 and RES.CONS.CESPT, 2001).

Even though recent expansion of the system has been minimal, it is important to emphasize that in the first four months of 2002, some sewage collector pipes in poor condition were replaced, as wells as sections where the pipe had surpassed its useful life, and where clay or simple-concrete pipes exist in poor condition.

Rehabilitation and improvement projects, certified by BECC in 2001, are currently in progress. The objective at this program is to rehabilitate approximately 429,034 feet (130,770 m) of sewer pipe, ranging from 8 to 48-inches (22 to 122 cm) in diameter, which in 2000, represented 5 percent of the total length of the system. The program includes 50 construction projects that will renovate 36 laterals, 7 sewage collectors, 6 subcollectors, and one interceptor. The proposed work was prioritized by CESPT in close association with BECC, EPA, and the State of California. Subsection 3.4.8 (Current and Planned Projects) lists the construction work planned as part of the certified project.

During the field trips, it was possible to identify the problems that are most characteristic of the sewer infrastructure. These are primarily:

- Debris accumulation
- Bottlenecks
- Erosion of pipes and manholes
- Missing, broken, or crumbling sections of pipe
- Hydraulic overload
- Sections with negative slopes

A CESPT inspection program has detected a high level of corrosion in some sections of the sewer system, especially in the oldest simple concrete pipes in the city (downtown Tijuana), which have been detected by CESPT's inspection program. Video cameras have been used to inspect the sewer lines in Tijuana, but not in the Playas de Rosarito system.

The blockage of lines is common, mainly due to crumbling pipes that have surpassed their useful life, the accumulation of grease, debris, garbage, and sediments that wash in during rain events.

Figure 3-21 shows the area of the city with the greatest problems due to lines that have surpassed their useful life. Appendix J, Table J-4, lists the *colonias* (neighborhoods) with the most problems. The entry of storm waters into the sewer system generates problems because of the system's inability to manage these flows, which leads to wastewater spillage. Figure 3-22 shows the places where this is an issue. Similarly, the runoff from unpaved streets and small hills during storms contributes to the buildup of debris in the sewer system. In Appendix J, Table J-5, the most frequent problems are presented for each collector and subcollector.

Another problem that the CESPT maintenance personnel face is the lack of enough space to maneuver during pipe cleaning activities. Similarly, topographic conditions limit the entrance of machinery and cleaning equipment in some areas of the system.

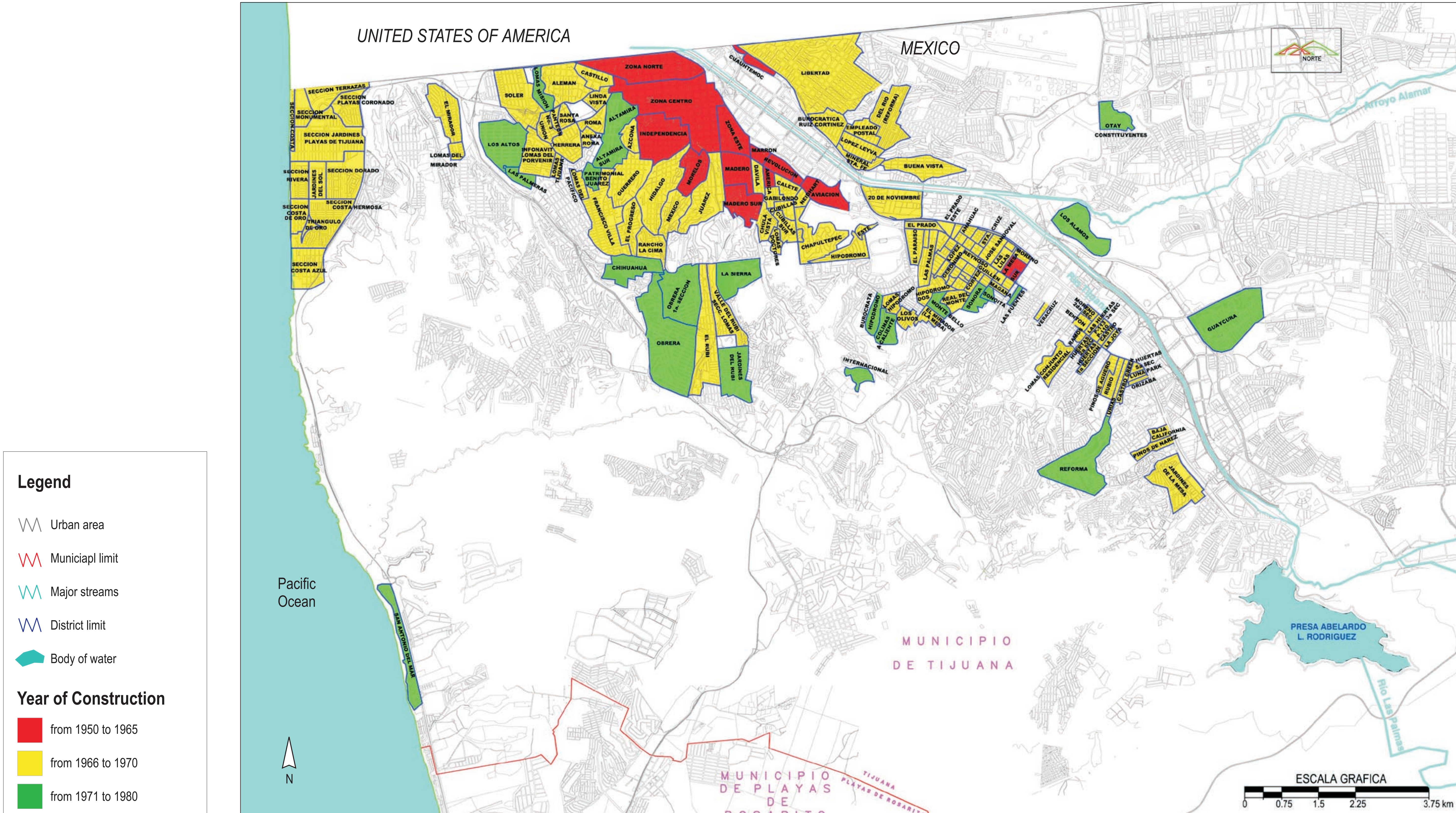
Another problem is the lack of sufficient maintenance equipment and personnel, which has caused work delays and contributed to the deterioration of the system. The lack of maintenance personnel means that work usually focuses on corrective maintenance and not preventive maintenance.

### 3.4.4 Service Coverage

As mentioned earlier, in 2001, the sewer system served approximately 79 percent of the population of Tijuana and Playas de Rosarito. However, it is estimated that only 61 percent of the surface of the study area 37,960 of 61,793 acres (15,362 of 25,007 hectares) has sewer service.

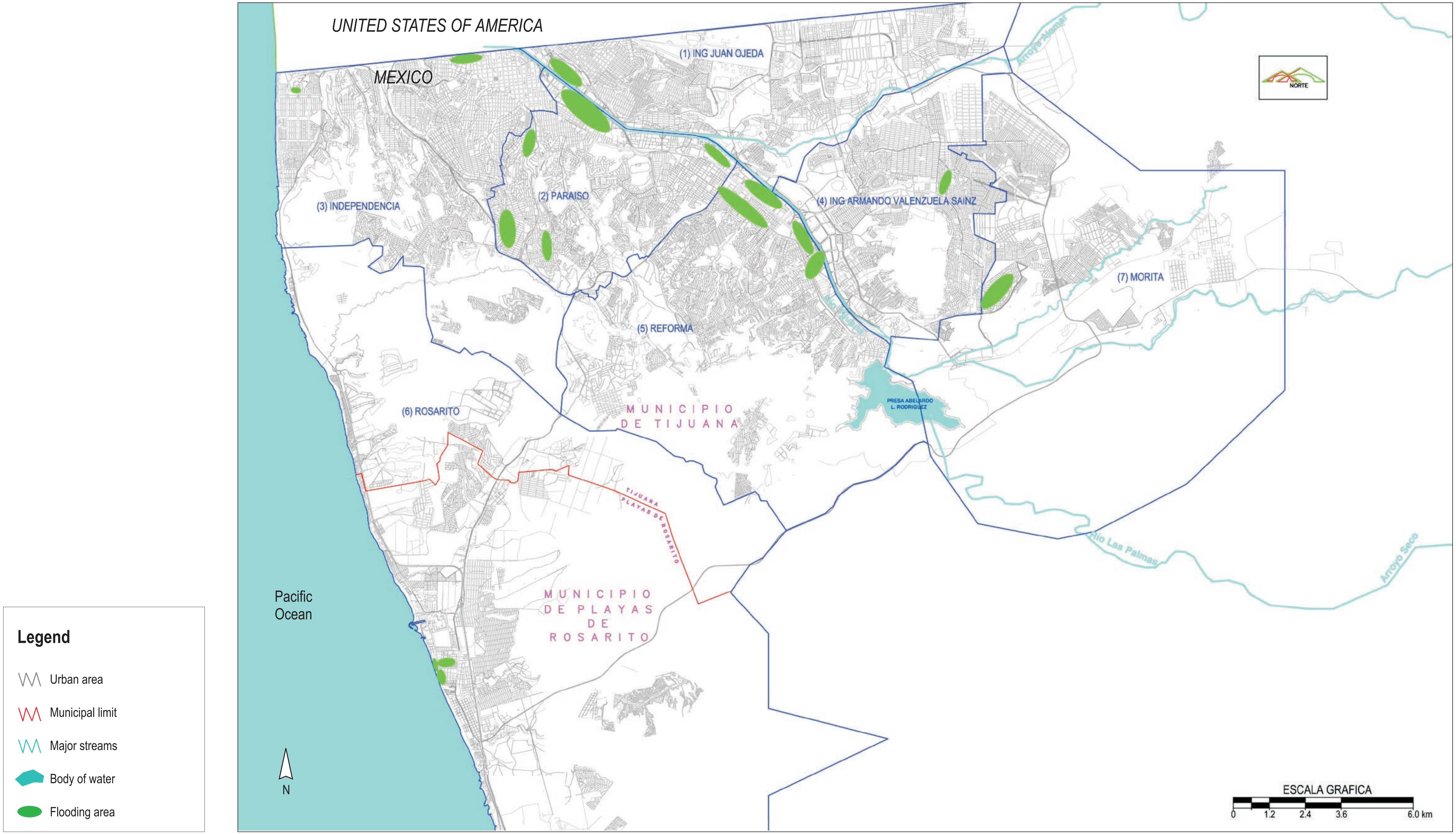
Figure 3-23 shows the portions of the study area that have sewer service and those that do not. The *colonias* (neighborhoods) that lack service are for the most part relatively new and located in the periphery of the city. The residents of these areas use alternative methods to dispose of their wastewater and excreta, the most common being septic tanks, latrines, and open ditches. Appendix J, Table J-6, lists the *colonias* (neighborhoods) that do not have sewer service.

As of today, CESPT has not implemented technical assistance programs for septic-tank or dry toilet construction in *colonias* (neighborhoods) without sewer service. During the field visits, residents of these areas mentioned their willingness to construct alternative systems provided CESPT takes responsibility for the cleaning.




CDM

**Figure 3-21**
**Areas where pipelines have exceeded useful life**




CDM

**Figure 3-22**
**Areas of flooding and wastewater overflows during periods of rainfall**

CESPT has tried to minimize raw wastewater discharges to streams, such as the Tijuana River and the Alamar Arroyo, but these have not been eliminated completely.

Contracting sewer service and connecting to the system is one of the services that CESPT offers. CESPT makes the connection to the system in order to ensure that this is done correctly and in a way that does not affect existing facilities. Construction activities on private property are the responsibility of the owner, and construction must follow CESPT specifications.

### 3.4.5 Industrial Pretreatment Program

The NOM-002-ECOL-1996 regulates industrial discharges to the sewer system. It sets maximum allowable limits for various contaminants (see Section 2.5). The application of these regulations is the responsibility of the State Department of Ecology (Departamento de Ecología), and it is outside CESPT's jurisdiction. Nevertheless, due to its strong interest in avoiding toxic waste discharges into the sewer system, CESPT has been working on the development and implementation of a program for industrial pretreatment.

Section 14 includes a description of an industrial pretreatment program that could be implemented in the future.

### 3.4.6 Operation and Maintenance Practices

CESPT has an Operation and Maintenance Division for potable water, sewer, and sanitation. This office is divided into four departments: Maintenance, Operational Control, Electromechanics, and Potable Water.

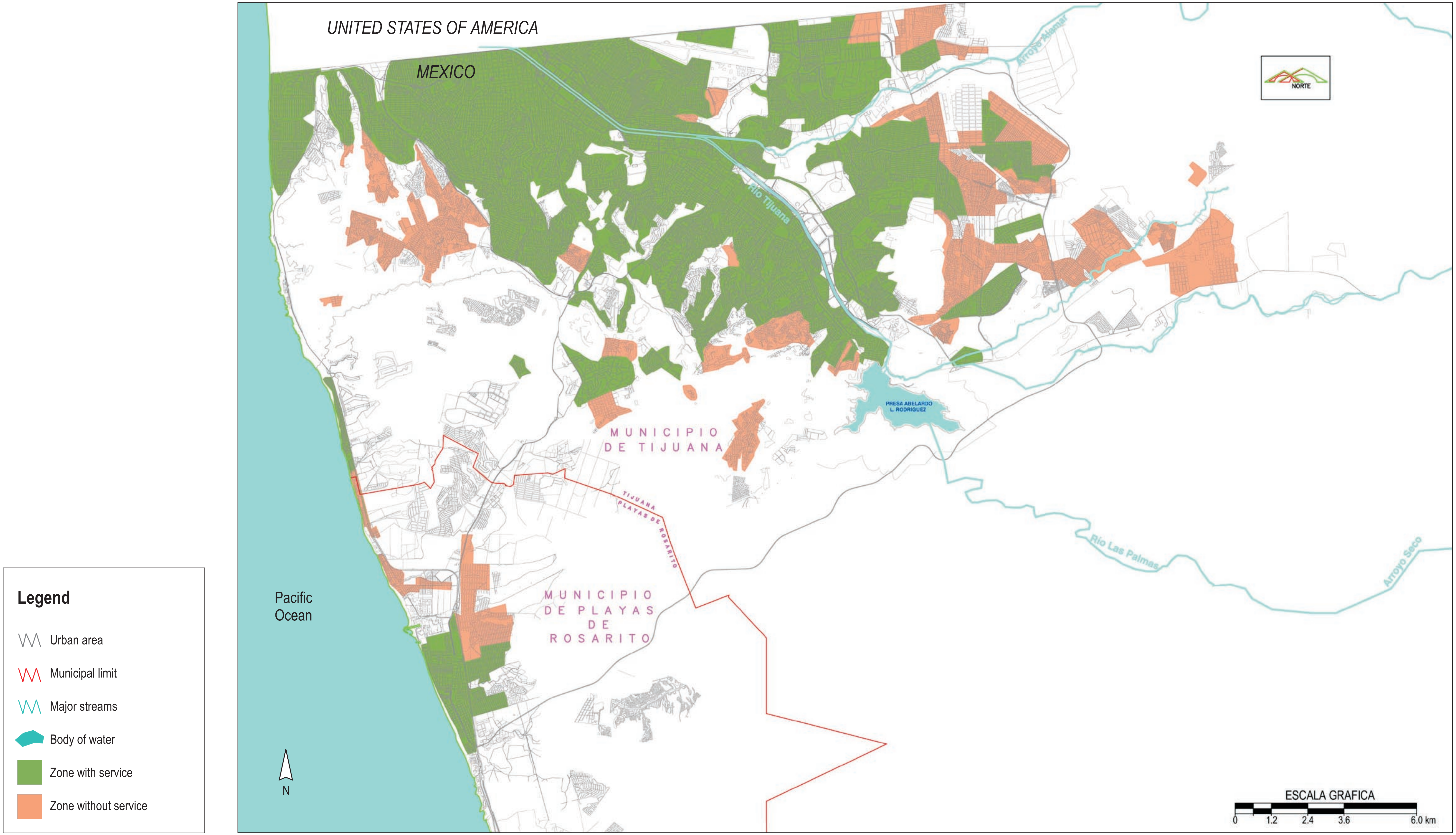



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**Figure 3-23**
**Areas with and without sanitary sewage system**

The Department of Maintenance is responsible for rehabilitating and operating the potable water and sewer systems. It is divided into seven operation and maintenance districts, each with its own structure and personnel:

- Juan Ojeda Robles
- Paraíso
- Independencia
- Ing. Armando Valenzuela
- Reforma
- Rosarito
- La Morita

The personnel working in these districts are responsible for maintenance, repairing leaks in pipes, tanks, manholes, and small pumps, and the installation of new pipes, and domestic discharges.

Maintenance is performed by crews. A programmer classifies and assigns jobs to each crew. Work orders are based on the requests received and are generated by the Tijuana Office of Control and Distribution and by the Playas de Rosarito billing office.

Each district has a programming area where the field requests are printed and classified according to the type of job required. The work order is assigned to a specific crew that will perform the work and will later return the order with the dates on which the job was completed.

The Department of Operational Control has equipment to assess the physical condition of sewer pipes, such as video cameras to inspect the pipe interiors. With this technology, it is possible to observe the level of debris accumulation in the pipes, as well as their physical deterioration, enabling a diagnosis and a plan for rehabilitation and maintenance.

Another tool is the Operations Manual for each system, which describes the methods of infrastructure maintenance and repair of damages.

## 3.4.7 Procedural Framework

### Procedures for Introducing Service to New *Colonias* (Neighborhoods)

In legally established *colonias* (neighborhoods), in *colonias* undergoing legalization, and in legally planned new neighborhoods under construction, the residents normally request service from CESPT, which evaluates the technical feasibility of providing service connection to some point in the sewer system.

Once the technical feasibility has been approved, a topographic survey of the area is performed to prepare adequate planimetry and altimetry. Following this, a project design is developed and the budget is established, so that CESPT can determine if the necessary funds are available.

The implementation of projects also depends on political and social programs established by the governments, and on the changes in administration at the municipal, state, and/or federal levels, where it is determined when and to which *colonias* (neighborhoods) to supply service.

The developers must prove ownership of the land and the feasibility of service. In these cases, the sewer system is not connected until the first construction module of a wastewater treatment plant is available.

In order to choose the points where sewage will enter the system from newly created developments and *colonias* (neighborhoods), a technical opinion is prepared to verify that sufficient capacity exists in the nearest subcollector, and following that, CESPT personnel notify the developer of the appropriate place for the discharge. After the authorization for the connection, the Operation and Maintenance Office (Sub-direccíon de Operación y Mantenimiento), reviews the project.

Regulations that SAHOPE issued in December 1997 apply for the design of the sewer system. The developers and CESPT must meet the specifications established in those regulations. Also applicable is the law that regulates the provision of drinking water, issued by SAHOPE in November 1969.

CESPT does not have an ongoing program to expand the system. Instead, it expands based on the demand for service. The only program that CESPT considers permanent is for the rehabilitation of pipes.

The only short-term program for the expansion for the sewer system is included as part of the Japanese Credit program. It is expected that by the end of 2005, 35 planned projects for the sewer system will have been completed.

To authorize an installation to a new development, CESPT requires documents approved by other institutions, such as the city's Urban Development Department (Desarrollo Urbano del Municipio), in regard to land use.

In the past, SAHOPE has worked together with CESPT to determine the feasibility of providing service. To achieve this, periodic meetings, called urban information workshops, were held, in which companies such as TELNOR, the gas company, and others attended to discuss specific problems. Currently, meetings have been held and agreements made with CNA, SAHOPE, and CEA, but these are not legally binding.

### 3.4.8 Current and Planned Projects

Among the most important projects that CESPT plans to implement in the future is the Sewer System Rehabilitation and Improvement Program for Tijuana and Playas de Rosarito. Some of the projects have actually started.

This program entails the rehabilitation of sewer lines in poor condition that occasionally cause wastewater spillages. Rehabilitation work will include 429,034 feet (130,770 meters) of sewer lines, including 392,410 feet (119,607 meters) of laterals, 19,153 feet (5,838 meters) of collectors, 14,189 feet (4,325 meters) of subcollectors, and 3,280 feet (1,000 meters) of interceptors.

The rehabilitation program will be financed jointly by CESPT, with internally generated revenues, and by the North American Development Bank (NADBank), from its Border Environmental Infrastructure Fund (BEIF). With this financing plan, CESPT will rehabilitate approximately 193,460 feet (58,967 meters) of pipe, of which 176,118 feet (53,681 meters) are laterals, 7,063 feet (2,153 meters) subcollectors, and 10,278 feet (3,133 meters) collectors. Table J-7, Appendix J, lists the works that CESPT will undertake.

For its part, the NADBank funding will be used to renovate 54,793 feet (16,701 meters) of pipe, of laterals. Table J-8, Appendix J, lists the works that will be funded by the EPA.

In addition to this program, CESPT will undertake a series of sanitation projects included under the Japanese Credit program, which includes 35 projects benefiting 289,313 residents through the construction of approximately 2,413,228 feet (735,552 meters) of sewer pipe. Table J-9, Appendix J, lists the *colonias* (neighborhoods) that will benefit from these works. The implementation of these projects will help to increase the coverage of the system.

## 3.5 Sanitation

### 3.5.1 Introduction

The study area has five wastewater treatment plants, which range in capacity from 35,000 gpd to 25 mgd (1.5 to 1,100 l/s). Two of these plants provide treatment for the wastewater generated in Tijuana, while another treats wastewater from Playas de Rosarito. The two remaining plants are low-capacity and treat water from San Antonio del Mar and Puerto Nuevo. These two plants are less relevant to the development of this plan because of their location and low-level capacity (see Figure 2-13).

Wastewater generated in Tijuana is treated at the San Antonio de Los Buenos (Punta Bandera) Wastewater Treatment Plant, located 11 miles (18 km) south of Tijuana, next to the Pacific Ocean, and at the South Bay International Wastewater Treatment Plant (SBIWTP), located in San Diego. Despite its United States location, the SBIWTP treats wastewater generated exclusively in Tijuana.

As mentioned in Section 2, most of the sewer system service area is located within the Tijuana River Basin, which flows toward the United States and ultimately discharges into the Pacific Ocean. There are also arroyos (natural channels) such as Los Laureles and Matadero that flow from Tijuana into the United States.

The area's topography results in a tendency for wastewater to flow to the Tijuana River and ultimately to the United States. Pumping station PB-1 is located near the border and intercepts part of the wastewater flow for its subsequent conveyance to San Antonio de Los Buenos Wastewater Treatment Plant. The rest of the flow goes to the SBIWTP by gravity.

Both plants discharge their wastewater into the ocean. San Antonio de Los Buenos uses an open channel that leads directly to the coast, while the SBIWTP uses an ocean that discharges 3.5 miles (5.6 km.) out to the ocean.

The exact quantity of wastewater generated in Tijuana and Rosarito is unknown. Uncertainty exists about the number of residents who lack sewer service as well as about the quantity of wastewater that, due to leaks or spills, may enter the sewer system without first passing through pumping stations or treatment plants where flow is measured. However, there is data about wastewater flows into the 5 treatment plants, as described later in this section. It should be noted that flows measured in the main to San Antonio de Los Buenos includes wastewater that will be treated in the plant, and wastewater that will not be treated due to the plant's lack of capacity.

As mentioned in Section 2.5.2, Mexico's wastewater treatment plants must not exceed the maximum allowable limits established by NOM-001-ECOL-1996. In specific cases, the CNA issues Specific Discharge Conditions (*Condiciones Particulares de Descarga*, CPD's), which set the maximum allowable limits for a specific plant.

The SBIWTP, located in the United States, is not subject to the regulations imposed by NOM-001-ECOL-1996, but it must comply with the discharge permit granted by the State of California.

## 3.5.2 Current Conditions of Treatment Plants

### 3.5.2.1 South Bay International Wastewater Treatment Plant (SBIWTP)

The governments of Mexico and the United States agreed through Minute 283 of the International Boundary and Water Commission, signed July 2, 1990, to construct a binational wastewater treatment plant with a capacity of 25 mgd (1,100 l/s). As a result of this agreement, in 1997, the South Bay International Wastewater Treatment Plant (SBIWTP) was built near Dairy Mart Road in the City of San Diego. Despite its United States location, the SBIWTP treats wastewater generated exclusively in Tijuana. The City of San Diego has built the South Bay Reclamation Plant, on an adjacent lot, which will treat wastewater generated in San Diego.

Originally the treatment plant provided for secondary treatment of 25 mgd (1,100 l/s) of Tijuana wastewater. Nevertheless, to date only an advanced primary treatment module has been built and is operating. It is anticipated that the secondary treatment module will be built in the near future, although as yet the type of secondary treatment that it will employ is unclear.

The SBIWTP is located in a 74-acre (30 hectare) lot, on which approximately 45 acres (18 hectares) contain the treatment facilities. The remaining space could be used to build the secondary treatment module.

Using an 18,500 feet (5,560 m) long and 12 feet (3.7 meters) diameter ocean outfall, the SBIWTP discharges its effluent 3.5 miles (5.6 km.) out in the Pacific Ocean. The outfall has a 174 mgd (7,623 l/s) capacity, (Source: Atlas, 2002).

The treatment plant consists of a pumping station, flow meter, chemical treatment area, primary sedimentation tanks with a flocculation and sedimentation area, and a disinfection system in addition to the ocean outfall pipe. There are also support facilities, such as a control center, polymer storage, electric substation, administrative offices, and a laboratory.

Sludge management consists of lime stabilization and dewatering followed by disposal at a site near the San Antonio de Los Buenos Wastewater Treatment Plant. The sludge management system consists of a sludge pressing-and-dewatering building, sludge storage tanks, a control center, operations office, odor-reduction station, and a loading dock. The daily rate of sludge output is approximately 23,634 gallons (90 $m^3$).

The stabilized sludge is transported to San Antonio de Los Buenos Wastewater Treatment Plant, located almost 9.3 miles (15 km) away, by 7,878 gallons (30 $m^3$) capacity trucks, moving an average of 4,848 gallons (18 $m^3$) of sludge per trip.

Table 3-18 summarizes the influent flows recorded at the SBIWTP from 1999 through 2001. The annual averages in the table were calculated based on daily averages provided by the IBWC.

**Table 3-18**
**Operational Flows, SBIWTP**

| Year | $m^3$/year | l/s |
|---|---|---|
| 1999 | 32,077,259 | 1,019 |
| 2000 | 33,596,247 | 1,065 |
| 2001 | 33,160,104 | 1,052 |

Source: IBWC

As shown in Table 3-18, the flows entering the plant are approximately the designed capacity of 25 mgd (1,100 l/s). Mexico has agreed to intercept flows within Mexico and allow into the United States only a flow that is equal to the SBIWTP's capacity. As the wastewater generation increases in Tijuana, the treatment capacity in Mexico must also increase because no planned expansion of the SBIWTP currently exists.

The SBIWTP discharges must meet quality standards established by the State of California and specified in the National Pollutant Discharge Elimination System (NPDES) permit for the plant. To date, it has not been possible to get a copy of the permit, although this information will be included in the next deliverable. Nevertheless, Table 3-19 shows the allowable limits according to the California Ocean Plan, which are likely similar to limits set in the discharge permit (NPDES).

**Table 3-19**
**California Ocean Plan Allowable Discharge Limits**

| Parameter | Monthly Average | Weekly Average | Instantaneous Maximum |
|---|---|---|---|
| Grease and oil (mg/l) | 25 | 40 | 75 |
| Suspended solids (mg/l) | 75 percent removal, based on a 30-day average | | |
| Settleable solids (ml/l) | 1 | 1.5 | 3 |
| Turbidity (NTU) | 75 | 100 | 225 |
| Total coliform | No more than 20 percent of the samples in a 30-day period can have concentrations above 1,000 MPN/100 ml | | |
| Fecal coliform | The geometric average of 5 samples in a 5-day period cannot exceed 200 MPN/100 ml.<br>No more than 10 percent of the samples in a 60-day period can have concentrations above 400 MPN/100 ml. | | |
| PH | 6 – 9 | | |
| Acute toxicity | 1.5 | 2 | 2.5 |

NOTE: California Ocean Plan does not include BOD as a parameter. However, it sets a limit of no more than 10 percent for reduced dissolved oxygen in the receiving body of water.

Table 3-20 summarizes water quality data for the past three years (1999-2001). The information presents the annual average estimated based on monthly averages provided by IBWC.

**Table 3-20**
**Summary of Influent (IN) and Effluent (EF) Water Quality, SBIWTP, 1999-2001**

| Parameter | Unit | 1999 | | 2000 | | 2001 | |
|---|---|---|---|---|---|---|---|
| | | Influent | Effluent | Influent | Effluent | Influent | Effluent |
| BOD5 (total) | mg/l | 318 | 101 | 294 | 100 | 329 | 102 |
| Chemical Oxygen Demand | mg/l | 703 | 341 | 1,129 | 409 | 1,106 | 358 |
| Grease and Oil | mg/l | 32 | 13.1 | 20 | 12.7 | 26 | 14 |
| Total Solids | mg/l | 1,537 | 1,319 | 1,632 | 1,253 | 1,955 | 1,477 |
| Total Volatile Solids | mg/l | 727 | 1,083 | 996 | 971 | 1,145 | 1,264 |

**Table 3-20**
**Summary of Influent (IN) and Effluent (EF) Water Quality, SBIWTP, 1999-2001**

| Parameter | Unit | 1999 | | 2000 | | 2001 | |
|---|---|---|---|---|---|---|---|
| | | Influent | Effluent | Influent | Effluent | Influent | Effluent |
| Suspended Solids | mg/l | 326 | 88 | 314 | 80 | 313 | 74 |
| Volatile Suspended Solids | mg/l | 183 | 65 | 219 | 60 | 236 | 57 |
| Settleable Solids | ml/l | 0.9 | 0.1 | 1.2 | 0.1 | 1.9 | 0.1 |
| Ammonia (as N) | mg/l | 84 | 73 | 78 | 73 | 69 | 65 |
| Average Annual Flow | l/s | 1,018 | | 1,065 | | 1,057 | |
| Average Annual Flow | m³/year | 32,114,766 | | 33,693,641 | | 33,326,386 | |
| Source: IBWC | | | | | | | |

According to the information presented in the table above, SBIWTP does not currently meet the discharge limits established by the California Ocean Plan. As mentioned earlier, there are plans to add secondary treatment at this plant, which should allow it to comply with regulations.

### 3.5.2.2 San Antonio de Los Buenos

In 2001 the Pumping Station PB-1 received an average of 45 mgd (1,967 l/s) of wastewater generated in Tijuana. From there, an average 24 mgd (1,052 l/s) to SBIWTP and 21 mgd (915 l/s) to the San Antonio de Los Buenos Treatment Plant.

The conveyance of wastewater to San Antonio de Los Buenos is done through two parallel lines. The first segment of the line is pressurized from PB-1 to the highest point of the route, after which point, water flows by gravity. The pressurized segment of the first line was constructed of reinforced concrete with a 42-inches (1067 mm) diameter, and a length of 14, 436 feet (4,400 meters). The gravity segment is made of reinforced concrete pipeline 60-inches (1524 mm), in diameter and 14, 436 feet (4,400 meters) in length, followed by a 25,053 feet (7,880 meters) long open-air channel with a concrete liner.

The second line consists of a pressurized ductile iron pipeline with a diameter of 48-inches (1219 mm) and a length of 20,308 feet (6,190 meters), followed by a gravity pipeline made of high-density polyethylene, 54-inches (1372 mm), in diameter and with a length of 40,748 feet (12,420 meters).

Figure 3-24 shows the location of the pump stations and conveyance lines.

Volumes of flow coming out of the pumping stations PB-3 3.9 mgd (170 l/s) average for the year 2001), INV 1 mgd (43 l/s), Mirador 274,000 gpd (12 l/s), Laureles 388,000 gpd (17 l/s), Playas 2 mgd (94 l/s), and Lázaro Cárdenas 685,000 gpd (30 l/s) are fed into the parallel mains, and join the flow from the PB-1 (Information provided by the Sub-division of Sanitation).

The San Antonio de Los Buenos Plant is located on a hill 112 meters above sea level. Therefore, a considerable amount of pumping is required to bring the water from the collecting system to the plant. The plant was built in 1987 and began operation in 1988 for an average design volume of 17 mgd (750 l/s). Currently the plant is being renovated, which should increase the treatment capacity to 25 mgd (1,100 l/s).

The treatment process consists of two aeration ponds in series, followed by a third sedimentation pond. The aeration ponds have a retention time of three days, while the sedimentation pond has a retention time of two days. The three ponds have a usable depth of 15 feet (4.5 m).

Aside from the aerated and sedimentation ponds, the plant has screens, grit removal, pumping station, chlorination system, electrical substation, offices, laboratory, and blower building.

The sludge generated at the plant reaches a certain level of stabilization as a result of its retention time in the ponds. However, no studies have been done on the quality of the sludge or the possible uses it could have.

According to CESPT, the sludge has been removed from the ponds only once, in 1993. At that time a pond was built especially for the collecting and disposal of the sludge on one side of the plant. Currently, there is a large amount of sludge accumulated in the ponds. The removal of the accumulated sludge from the ponds is planned as part of the renovation work. Once again they will construct a new pond to store sludge next to the plant, because the cost of transferring and disposing of the sludge to another site is not included in the budget. In the future it is hoped that the sludge can be removed from the plant site and sent to a sanitary landfill.

At present, rehabilitation work is underway that will increase the treatment capacity of the plant to an average flow of 25 mgd (1,100 l/s). The rehabilitation consists mainly of the addition of more aerators to the aeration ponds and in the division of the sedimentation pond. The rehabilitation work began in December 2001 and will be finished in March 2003.

**Descripción de las**
**Lineas de alejamiento:**
**Existente**
-Emisor a presión
tuberia de concreto
preseforzado 42" Ø
longitud 4,400 m
-Gravedad: Tubería de
concreto armado de
60" Ø long. 4,400 m
-Canal a cielo abierto
recubierto con losa
de concreto long.
7,880. M

Long. Total 16,680 m

**Paralela (nueva)**
-Emisor a presión
tuberia de hierro preseforzado
48" Ø longitud 6,190 m
-Gravedad: Tuberia de
polietileno de alta densidad
combinado hierro ductil de
54" Ø long. 12, 420 m

Long. Total 18,610 m


## Legend

- Major streams
- Emission
- Interceptor
- Collector
- Pressure line
- Pump station
- Grit removal chamber
- Urban area

CDM

**Figure 3-24**
**Location of pump stations and conveyance lines**

During the first stage, 40 aerators with 40 Hp each will be installed in the first pond and 15 aerators with 40 Hp in the second pond. In the second stage, another 25 aerators with 40 Hp will be installed in the second pond. They will also divide the third pond into two to allow for the dredging of one pond while the other is in operation (Information provided by the Sub-division of Wastewater).

Table 3-21 summarizes the average annual influent flows for the plant during the period 1996–2001. The annual averages were calculated based on the monthly averages provided by CESPT. This table shows that the plant received a flow smaller than the design flow (750 l/s) until 1998. However, during the following years (1998-2001) the influent flows have been greater than design flow.

**Table 3-21**
**Influent Flows to the San Antonio de Los Buenos WWTP**

| Year | $m^3$/year | l/s |
|---|---|---|
| 1996 | 24,009,408 | 761 |
| 1997 | 23,284,422 | 738 |
| 1998 | 23,205,476 | 736 |
| 1999 | 28,032,876 | 889 |
| 2000 | 29,202,236 | 926 |
| 2001 | 28,356,120 | 899 |

It is important to point out, however, that although the average annual flow treated at the plant in 2001 was 20.5 mgd (899 l/s), the line coming from PB-1 carried an average of 29 mgd (1,265 l/s) to the plant site. The excess flow of raw wastewater 8.4 mgd (366 l/s) bypassed the treatment system and was only chlorinated and mixed with the effluent from the plant before being discharged into the ocean. By expanding the plant, those excess flows will receive treatment in the near future.

Approximately 1.6 mgd (70 l/s) of the effluent are used to irrigate the green areas of the plant.

There is a discrepancy in the interpretation of the maximum allowable limits to which the discharge must comply. On one hand, the CNA issued the Specific Discharge Conditions (SDC) for the San Antonio plant in 1994. These conditions are valid for ten years. On the other hand in 1996, NOM-001-ECOL-1996 (NOM) was published, which establishes maximum allowable limits for the discharge into national bodies of water, such as the coast of the Pacific Ocean. Generally speaking, the SDC's are stricter than the NOM.

Table 3-22 summarizes the maximum allowable limits of discharge established by NOM-001-ECOL-1996, and those established by the SDC, and Table 3-23 presents plant influent and effluent quality.

| Table 3-22<br>Maximum Permissible Limits for San Antonio de Los Buenos de Acuerdo WWTP established by NOM-001-ECOL-1996 and the Particular Conditions of Discharge | | | | |
|---|---|---|---|---|
| Parameter (mg/l, except when indicated to the contrary) | NOM-OO1-ECOL-1996 (for coastal waters with recreational uses) | | PCD for the San Antonio de Los Buenos WWTP | |
| | Monthly Average | Daily Average | Monthly Average | Instantaneous Maximum |
| Temperature (°C) | 40 | 40 | N.A. | 30 |
| Oil and Grease | 15 | 25 | 10 | 15 |
| Floating Material | Absent | Absent | Absent | Absent |
| Settlable Solids (ml/l) | 1 | 2 | 1.0 | 1.2 |
| Total Suspended Solids | 75 | 125 | 30 | 40 |
| Chemical Oxygen Demand | N.A. | N.A. | 100 | 140 |
| Biochemical Oxygen Demand ($BOD_5$) | 75 | 150 | 30 | 45 |
| Biochemical Oxygen Demand-soluble | N.A. | N.A. | 20 | 25 |
| Ammonia Nitrogen (N) | N.A. | N.A. | 10 | 15 |
| Total Nitrogen | N.A. | N.A. | 20 | 25 |
| Total Phosphorus | N.A. | N.A. | 8 | 10 |
| Inorganic Phosphorus | N.A. | N.A. | 6 | 8 |
| Arsenic | 0.2 | 0.4 | 0.5 | 0.75 |
| Cadmium | 0.2 | 0.4 | 0.05 | 0.075 |
| Cianide $CN^-$ | 2.0 | 3.0 | N.A. | N.A. |
| Total Copper | 4.0 | 6.0 | N.A. | N.A. |
| Total Chrome | 1 | 1.5 | | |
| Hexavalent Chrome | N.A. | N.A. | 0.5 | 1.0 |
| Total Mercury | 0.01 | 0.02 | N.A. | N.A. |
| Total Nickel | 2 | 4 | 1.0 | 1.5 |
| Lead | 0.5 | 1 | 1.0 | 2.0 |
| Zinc | 10 | 20 | | |
| Fecal Coliforms (NMP/100mL) | 1,000 | 2,000 | N.A. | 1,000 |
| Total Coliforms (ufc) | N.A. | N.A. | N.A. | 10,000 |

| Table 3-23<br>Summary of Influent (IF) and Effluent (EF) Water Quality, 1996-2001 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Unit | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | |
| | | IF | EF | IF | EF | IF | EF | IF | EF | IF | EF | IF | EF |
| BOD5 (total) | mg/l | 242 | 105 | 238 | 89 | 288 | 114 | 306 | 116 | 364 | 126 | 411 | 142 |
| Chemical Oxygen Demand | mg/l | 470 | 266 | 540 | 210 | 534 | 231 | 618 | 259 | 679 | 554 | 755 | 308 |
| Greases and Oils | mg/l | 55 | 28 | 53 | 18 | 42 | 14 | 41.9 | 10.7 | 41.3 | 11.1 | 58.6 | 7.8 |
| Total Solids | mg/l | 1,466 | 1,323 | 1,683 | 1,527 | 1,372 | 1,200 | 1,403 | 1,175 | 1,638 | 1,406 | 1,649 | 1,412 |
| Total Volatile Solids | mg/l | 238 | 154 | 379 | 242 | 359 | 219 | 414 | 256 | 430 | 274 | 432 | 257 |
| Suspended Solids | mg/l | 178 | 77 | 231 | 78 | 237 | 77 | 281 | 83 | 299 | 98 | 305 | 73 |
| Volatile Suspended Solids | mg/l | 99 | 44 | 169 | 65 | 154 | 60 | 193 | 65 | 215 | 81 | 219 | 49 |
| Settleable Solids | ml/l | 2.8 | 0 | 1.6 | 0 | 1.6 | 0 | 3.6 | 0.1 | 3 | 0.2 | 16.2 | 0.1 |
| Total Phosphorus | mg/l | 8.0 | 7.0 | 7.4 | 8.2 | 20.6 | 21.2 | 27.3 | 27.5 | 45.4 | 38.6 | 24.1 | 18.6 |
| Ammoniac Nitrogen | mg/l | 28.0 | 26.1 | 23.4 | 24.1 | 20 | 24 | 31.0 | 36.3 | 35.0 | 38.3 | - | - |
| Detergents (MBAS) | mg/l | 16.9 | 11.4 | 20.6 | 13.2 | 31 | 22 | 33.4 | 31.8 | 32.6 | 29.6 | 25.6 | 20.1 |
| Average Annual Volume | l/s | 761 | | 738 | | 736 | | 889 | | 926 | | 899 | |
| Average Annual Volume | $m^3$/year | 24,009,408 | | 23,284,422 | | 23,205,976 | | 28,032,876 | | 29,202,336 | | 28,356,120 | |

As shown in the information presented in the two previous tables, the effluent from the San Antonio de Los Buenos Plant does not comply with the maximum allowable limits established by NOM-001-ECOL-1996, nor with the limits established by the Specific Discharge Conditions (SDC).

The main problems at the plant (prior to its rehabilitation) are:

- Short circuits in the ponds
- The plant was designed for an influent water quality with lower loads than those observed
- The aeration system is inadequate and uses equipment for which there are no spare parts available on the market
- There is a hydraulic overload; the influent flows in recent years exceed the design flows
- Contaminant removal is inefficient and it does not comply with the standards established in the Specific Discharge Conditions and in the NOM-001-ECOL-1996
- Sludge cannot be removed while the plant is operating

### 3.5.2.3 Other Wastewater Treatment Plants

***Rosarito Wastewater Treatment Plant***

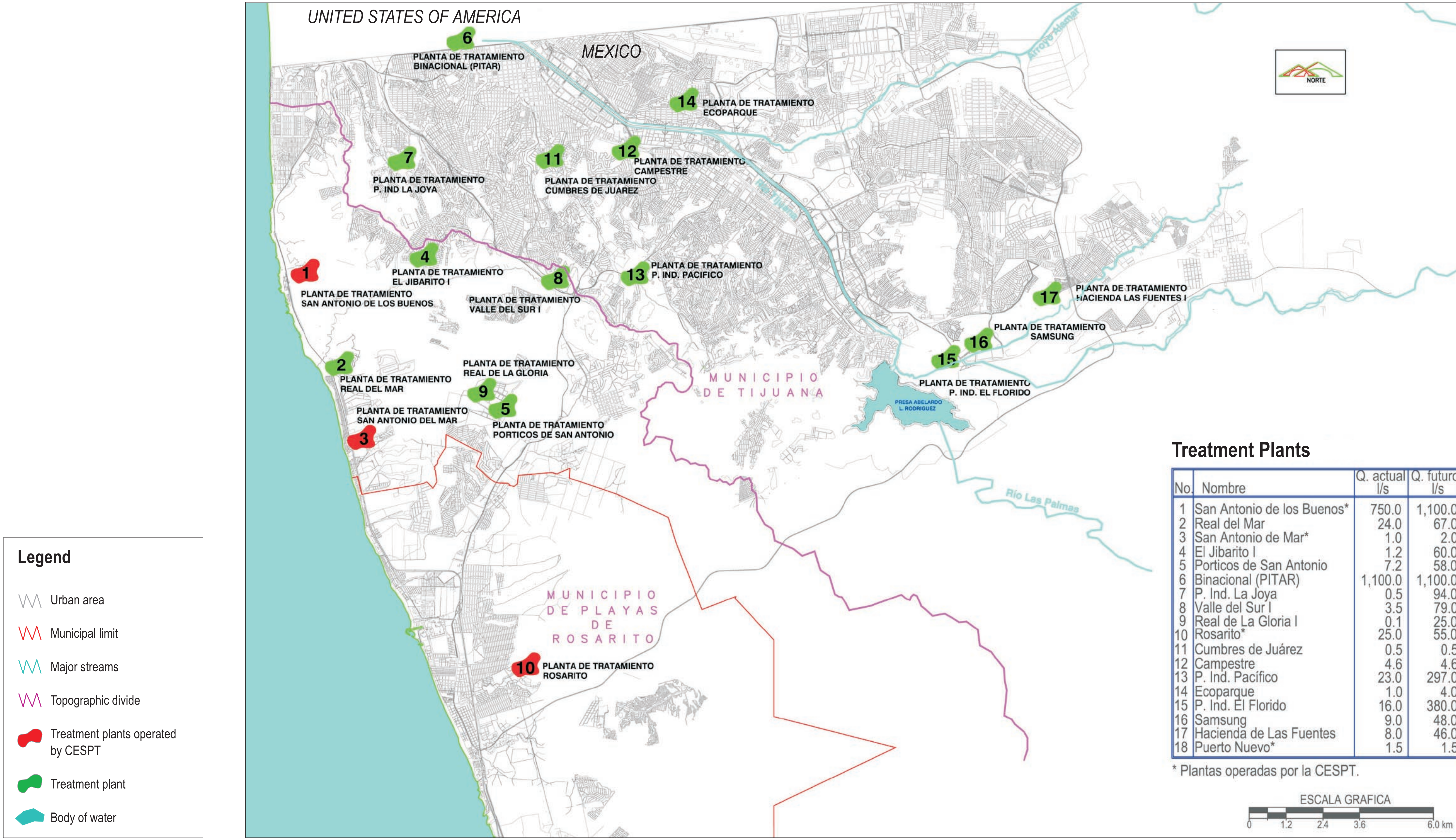
This plant treats wastewater generated in the City of Rosarito before its discharge into the ocean. The location of the plant is shown in Figure 2-13.

The plant consists of oxidation lagoons. The current average influent flow is 845,000 gpd (37 l/s). The treatment is done through two trains that consist of pre-treatment, an aeration pond, a transition pond, a sedimentation pond and a regulating pond. In addition, the plant has a sludge pond (Information provided by the Sub-division of Wastewater).

Since the sludge has not been removed in recent years, the aeration ponds (A1 and A2) are now up to 50 percent full of sludge, while the sludge occupies almost the entire volume of the transition ponds, and 50 percent of the sedimentation ponds and the storage pond (Information provided by the Sub-division of Wastewater).

Periodically the accumulated sludge is taken to the site used for the disposal of the sludge from the San Antonio de Los Buenos Plant.

In the first aerated pond, the treatment plant receives the discharge from tanker trucks that clean septic tanks.




## Treatment Plants

| No. | Nombre | Q. actual l/s | Q. futuro l/s |
|---|---|---|---|
| 1 | San Antonio de los Buenos* | 750.0 | 1,100.0 |
| 2 | Real del Mar | 24.0 | 67.0 |
| 3 | San Antonio de Mar* | 1.0 | 2.0 |
| 4 | El Jibarito I | 1.2 | 60.0 |
| 5 | Porticos de San Antonio | 7.2 | 58.0 |
| 6 | Binacional (PITAR) | 1,100.0 | 1,100.0 |
| 7 | P. Ind. La Joya | 0.5 | 94.0 |
| 8 | Valle del Sur I | 3.5 | 79.0 |
| 9 | Real de La Gloria I | 0.1 | 25.0 |
| 10 | Rosarito* | 25.0 | 55.0 |
| 11 | Cumbres de Juárez | 0.5 | 0.5 |
| 12 | Campestre | 4.6 | 4.6 |
| 13 | P. Ind. Pacífico | 23.0 | 297.0 |
| 14 | Ecoparque | 1.0 | 4.0 |
| 15 | P. Ind. El Florido | 16.0 | 380.0 |
| 16 | Samsung | 9.0 | 48.0 |
| 17 | Hacienda de Las Fuentes | 8.0 | 46.0 |
| 18 | Puerto Nuevo* | 1.5 | 1.5 |

* Plantas operadas por la CESPT.



Figure 3-25
Wastewater treatment plant sites not operated by CESPT

The effluent must comply with the limits established in the Specific Discharge Conditions (SDC), issued by the CNA for a period of ten years. The SDC's are summarized in Table 3-24 and the quality of the influent and effluent are shown in Table 3-25. It should be mentioned that the Rosarito Plant and the San Antonio de Los Buenos Plant are similar in that there are conflicts about the interpretation of the law concerning the need to follow NOM-001-ECOL-1996 or SDC.

**Table 3-24**
**Specific Discharge Conditions for the Rosarito Water Treatment Plant, April 11, 1997**

| Parameter | Average Concentration | Instantaneous Maximum Concentration | Load kg/day | Unit |
|---|---|---|---|---|
| Arsenic | 0.1 | 0.2 | | mg/l |
| Cadmium | 0.1 | 0.2 | | mg/l |
| Cyanide | 1.0 | 2.0 | | mg/l |
| Copper | 4.0 | 6.0 | | mg/l |
| Fecal Coliform | 1000 | 2000 | | mg/l |
| Chromium | 0.5 | 1.0 | | mg/l |
| $BOD_5$ | 75 | 150 | 220.35 | mg/l |
| Total phosphorus | 20 | 30 | | mg/l |
| Greases and Oils | 15 | 25 | 36.72 | mg/l |
| Floating Material | Absent | Absent | | mg/l |
| Mercury | 0.005 | 0.01 | | mg/l |
| Nitrogen, Total Kjeldahl | 40 | 60 | | mg/l |
| Nickel | 2.0 | 4.0 | | mg/l |
| Lead | 0.2 | 0.4 | | mg/l |
| TSS | 75 | 125 | 183.62 | mg/l |
| Settleable Solids | 1 | 2 | | mg/l |
| Temperature | 40 | 40 | | C° |
| Zinc | 10 | 20 | | mg/l |
| pH | 5-10 | 5-10 | | Units |

NOTE: The maximum daily loads for BOD (220.35 kg/day) and TSS (183.62 kg) refer to the instantaneous maximum concentrations or a volume of 34 l/s with average load. The discharge is authorized for ten years, 1997-2007.

**Table 3-25**
**Influent and Effluent Water Quality of the Treatment Plant, 1988 to 2001**

| Parameter | Unit | 1998 | | 1999 | | 2000 | | 2001 | |
|---|---|---|---|---|---|---|---|---|---|
| | | IF | EF | IF | EF | IF | EF | IF | EF |
| $BOD^5$ (total) | mg/l | 391 | 124 | 354 | 148 | 364 | 78 | 368 | 77 |
| Chemical Oxygen Demand (total) | mg/l | 708 | 344 | 689 | 350 | 636 | 246 | 609 | 264 |
| Greases and Oils | mg/l | 63.4 | 16.0 | 44.7 | 12.9 | 46 | 7.8 | 40 | 10.0 |
| Total Solids | mg/l | 2,414 | 1,873 | 1,869 | 1,721 | 1,890 | 1,755 | 2,106 | 1,971 |
| Total Volatile Solids | mg/l | 679 | 482 | 578 | 511 | 493 | 406 | 674 | 485 |
| Suspended Solids | mg/l | 303 | 74 | 318 | 112 | 250 | 99 | 254 | 91 |
| Volatile Suspended Solids | mg/l | 173 | 46 | 212 | 76 | 192 | 75 | 154 | 69 |
| Settleable Solids | ml/l | 2.9 | 0.3 | 4.2 | 0.1 | 3 | 0.03 | 3 | 0.12 |
| Total Phosphorus | mg/l | 24.8 | 24.7 | 25.3 | 26.7 | 45 | 33.2 | 23 | 20.3 |

**Table 3-25**
**Influent and Effluent Water Quality of the Treatment Plant, 1988 to 2001**

| Parameter | Unit | 1998 | | 1999 | | 2000 | | 2001 | |
|---|---|---|---|---|---|---|---|---|---|
| | | IF | EF | IF | EF | IF | EF | IF | EF |
| Ammoniac Nitrogen | mg/l | 24.5 | 25.1 | 41.1 | 39.5 | 41 | 40.5 | - | - |
| Detergents MBAS | mg/l | 38.2 | 31.1 | 34.2 | 34.1 | 36 | 10.6 | 29 | 6.3 |
| Average Annual Volume | l/s. | 27 | | 29 | | 31 | | 37 | |
| Average Annual Volume | $m^3$/year | 851,472 | | 914,544 | | 977,616 | | 1,166,832 | |

As shown in the data from the previous tables, the water quality received in the plant has improved over time on all the monitored parameters, although the treated water quality does not comply with the requirements of the SDC.

***San Antonio del Mar Wastewater Treatment Plant***

This treatment plant serves the community of San Antonio del Mar, located south of Rosarito. The plant is based on activated sludge with an extended aeration process, done in an oxidation ditch. The plant was built in 1997 for a design volume of 57,000 gpd (2.5 l/s). The average intake flow in 2001 was 48,000 gpd (2.1 l/s).

The plant has the following process units: pretreatment, oxidation ditch, secondary clarification and disinfection (chlorination). The sludge is dehydrated in drying beds for its later disposal at the site used by the San Antonio de Los Buenos Plant.

The maximum allowable limits of discharge for this plant are established by NOM-001-ECOL-1996. There are no SDC's for this plant. Table 3-26 shows a summary of the principal characteristics of the influent and the effluent of the plant for the past four years.

**Table 3-26**
**Characteristics of the Influent and the Effluent of the San Antonio del Mar Plant between 1998 and 2001**

| Parameter | Unit | 1998 | | 1999 | | 2000 | | 2001 | |
|---|---|---|---|---|---|---|---|---|---|
| | | IF | EF | IF | EF | IF | EF | IF | EF |
| $BOD^5$ (total) | mg/l | 261 | 21 | 237 | 11 | 238 | 25 | 213 | 17 |
| Chemical Oxygen Demand | mg/l | 509 | 100 | 404 | 45 | 405 | 71 | 397 | 54 |
| Greases and Oils | mg/l | 45 | 9 | 29.7 | 8.9 | 48.8 | 7.7 | 18.0 | 6.2 |
| Total Solids | mg/l | 963 | 781 | 1,030 | 838 | 1,205 | 1,039 | 1,221 | 1,112 |
| Total Volatile Solids | mg/l | 333 | 128 | 320 | 172 | 306 | 171 | 285 | 187 |
| Suspended Solids | mg/l | 187 | 43 | 163 | 30 | 165 | 37 | 148 | 24 |
| Volatile Suspended Solids | mg/l | 135 | 29 | 121 | 22 | 130 | 32 | 109 | 16 |
| Settleable Solids | ml/l | 1.8 | 0 | 3.3 | 0.0 | 3 | 0.0 | 2.5 | 0.1 |
| Total Phosphorus | mg/l | 15.9 | 7.2 | 15.1 | 5.5 | 22.0 | 6.2 | 14.5 | 5.5 |
| Ammoniac Nitrogen | mg/l | 14 | 7 | 22.9 | 1.9 | 22.8 | 6.4 | - | - |
| Detergents MBAS | mg/l | 24 | 2 | 24.3 | 1.5 | 21.8 | 3.3 | 12.8 | 1.9 |
| Average Annual Volume | l/s | | | 1.21 | | 2.01 | | 2.13 | |
| Average Annual Volume | $m^3$/year | | | 38,159 | | 63,387 | | 67,172 | |

As seen in the previous table, the plant complies with the maximum allowable limits established by NOM-001-ECOL-1996.

***Puerto Nuevo Wastewater Treatment Plant***

This plant is located in the hotel area of Puerto Nuevo, south of Playas de Rosarito. The plant has a design volume of 34,000 gpd (1.5 l/s) and consists of the following treatment processes: pretreatment (bar screens), regulation tank, aerobic reactor, clarifier and chlorine contact tank. The dehydration of the sludge is done with drying beds.

The plant receives high loads of BOD, TSS, and grease and oil, probably because of all the restaurants in the area. CESPT should evaluate the sewer connections in the plant's service area to try to reduce the organic load that enters the system. Likewise, they should analyze the merits of a pretreatment program for the restaurants, which would include among other things the installation of grease traps.

CESPT began to analyze the water quality (raw and treated) in January 2002 and data is available only for the first quarter of 2002, as presented in Table 3-27.

**Table 3-27**
**Characteristics of the Influent and the Effluent of the San Antonio del Mar Plant between January and March 2002**

| Parameter | Unit | January 2002 | | February 2002 | | March 2002 | | Average | | NOM 001 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | IF | EF | IF | EF | IF | EF | IF | EF | |
| BOD5 (total) | mg/l | 1,162 | 519 | 1,304 | 715 | 1,405 | 1,017 | 1,290 | 750 | **75** |
| Chemical Oxygen Demand (total) | mg/l | 1,878 | 1,128 | 2,060 | 1,403 | 246 | 2,098 | 2,131 | 1,543 | |
| Greases and Oils | mg/l | 209 | 75 | 336 | 36 | 201 | 173 | 249 | 95 | **15** |
| Total Solids | mg/l | 3,300 | 2,956 | 2,289 | 2,109 | 2,284 | 2,356 | 2,624 | 2,474 | |
| Total Volatile Solids | mg/l | 710 | 540 | 917 | 720 | 964 | 952 | 864 | 737 | |
| Suspended Solids | mg/l | 486 | 219 | 468 | 295 | 533 | 455 | 496 | 323 | **75** |
| Volatile Suspended Solids | mg/l | 420 | 190 | 394 | 256 | 443 | 390 | 419 | 279 | |
| Settleable Solids | ml/l | 4.1 | 0.2 | 5.5 | 0.2 | 6.9 | 1.1 | 6 | 0.48 | **1** |
| Total Phosphorus | ml/l | 70.0 | 52.0 | 25.1 | 11.2 | 25.1 | 6.5 | 40 | 23 | **N/A** |
| Ammoniac Nitrogen | ml/l | - | - | - | - | | | - | - | **N/A** |
| Detergents MBAS | ml/l | 69.0 | 51.0 | 53.1 | 49.7 | 64.2 | 61.2 | 62 | 54.0 | |
| Floating Material | | ABS. | ABS. | ABS. | ABS. | ABS. | ABS. | ABS. | ABS. | **ABS.** |
| Temperature | C$^o$ | 16.7 | 16.7 | 20.9 | 20.8 | 20.4 | 20.1 | 19 | 19.2 | **40** |
| pH | PH | 6.9 | 7.4 | 7.0 | 7.1 | 7.2 | 7.3 | 7 | 7.3 | **5-10** |
| Puerto Nuevo | l/s | 1.20 | | 1.20 | | 1.70 | | 1.37 | | |

The CNA has not issued SDC for this plant; therefore the discharge quality is regulated based on NOM-001-ECOL-1996. As shown in the previous table, the concentrations of the monitored contaminants are much higher than the limits established by the regulation. During the field visit to the plant, the level of aeration in the activated sludge was observed to be insufficient.

There are some wastewater treatment plants that are not operated by CESPT. Some of these plants discharge into arroyos (natural channels) and water quality for the influent and effluent is not available. Table 3-28 lists these plants and their operating flows, while Figure 3-25 shows their location.

**Table 3-28**
**Treatment Plants not operated by CESPT**

| **Description** | **l/s** |
|---|---|
| Parque Industrial Florido | 16 |
| Samsung | 9 |
| Parque Industrial Pacifico | 23 |
| El Jibarito | 1.2 |
| Porticos de San Antonio | 7.2 |
| Real de la Gloria | 0.1 |
| Real del Mar | 24 |
| Parque Industrial la Joya | 0.46 |
| Valle Sur I | 3.5 |
| Valle Sur II | 0.2 |
| Eco parque | 1 |
| Cumbres Juárez | 0.5 |
| Hacienda de las Fuentes I y II | 8 |
| Campestre | 4.6 |
| Lomas del Mar | 1.4 |
| **Total** | **100** |

Source: Comisión Estatal de Servicios Públicos de Tijuana Subdirección de Operación y Mantenimiento, Departamento de Saneamiento (State Commission of Public Services of Tijuana, Division of Operation and Maintenance, Dept. of Sanitation)

Only the first three plants are somewhat controlled by the CNA.

Additionally, in Tijuana there are 86 other private treatment plants, which are used mainly to treat industrial wastewater. Section 3.4.3 contains more information on these plants under the description of the pretreatment programs.

### 3.5.3 Operation and Maintenance Practices

CESPT relies on the Operation and Maintenance Division (Sub-dirección Operación y Mantenimiento), for the operation and maintenance of the sanitation systems, which is divided into the Department of Maintenance (Departamente de Mantenimiento de Redes), Department of Operational Control (Departamento de Control Operacíonal), Department of Electromechanics (Departamento de Electre Mecánica), Department of Potable Water (Departamento de Agua Potable), and Sub-division of Sanitation (Sub-Dirección de Saneamiento). The Department of Sanitation (Departamento de Saneamiento), is in charge of the operation and maintenance of the treatment plants.

Each plant has operation and maintenance staff assigned to it that is in charge of the daily operation and preventive maintenance of the plants. The corrective maintenance is performed by staff from the Department of Electromechanics (Departamento de Electro Mecánica), and occasionally by outside contractors.

CEPST has a staff of 19 workers for the operation of the treatment plants: ten for San Antonio de Los Buenos; three for Rosarito; two for San Antonio del Mar; and two for Puerto Nuevo.

As mentioned in Section 2, sampling of the influent and the effluent of each treatment unit is done on a daily basis for each plant. The parameters that are ordinarily analyzed are COD, total BOD5, greases and oils, total solids, total volatile solids, total suspended solids, volatile suspended solids, settleable solids, total phosphorus, and ammonia. Additionally, some heavy metals are analyzed which are included in NOM-001-ECOL-1996, such as arsenic, cadmium, cyanide, copper, chromium, mercury, nickel, lead and zinc. Monthly, an average of 115 analyses are done: 100 are of wastewater (raw and treated) and the rest are of sludge quality.

CESPT has a laboratory, located at the site of the San Antonio de Los Buenos Wastewater Treatment Plant, which is part of the Department of Discharge Control (Departamente de Control de Descargas). The department has a staff of thirteen: six discharge inspectors, four chemical analysts, one sample and two executives. There is no program for preventive maintenance for the laboratory, and problems are only taken care of in a reactive manner.

### 3.5.4 Current and Planned Projects

CESPT plans to undertake the following activities:

- Rehabilitation and expansion of the San Antonio de Los Buenos Plant, from 17 mgd (750 l/s) to 25 mgd (1,100 l/s). The renovation work began in December 2001 and is expected to conclude in March 2005.

- Construction of the Monte Los Olivos Treatment Plant, for a volume of 10.5 mgd (460 l/s). Over the course of the year 2000, a conceptual design and a construction plan were created. in the operation of the plant will be expected begin in 2005.

- Construction of the La Morita y Tecolote-La Gloria Treatment Plants, for a volume of 8.7 mgd (380 l/s ) each one. Construction is planned to begin during the year 2002 and for the work to finish in December 2005.

- Construction of the Lomas de Rosarito Treatment Plant, for a volume of 4.8 mgd (210 l/s). The construction of this plant will begin in 2005.

- The second stage of renovation and expansion of the San Antonio de Los Buenos Plant, for a volume of 34 mgd (1,500 l/s), planned for 2004.

- Construction of the secondary treatment module at International Wastewater Treatment Plant.

### 3.5.5 Procedural Framework

The Department of Projects, which is under the Construction Division, is in charge of studying and defining the construction of new plants and the renovation and expansion of existing ones.